CLAIMS

What is claimed is:

1. A method to store a bit of data, comprising:

exposing a volume of material, having a first conductivity, to an electron beam; and

damaging cross-links in the volume of material during said exposing, wherein the first conductivity of the volume of material is changed to a second conductivity wherein the bit of data is stored.

2. Said method of claim 1, wherein the first conductivity is associated with a first memory state of the bit of data and the second conductivity is associated with a second memory state of the bit of data.

3. Said method of claim 1, wherein the volume of material is a polymer.

4. A method to store a bit of data, comprising:

exposing a volume of material, having a first conductivity, to an electron beam; and

forming cross-links in the volume of material during said exposing, wherein the first conductivity of the volume of material is changed to a second conductivity wherein the bit of data is stored.

5. Said method of claim 4, wherein the volume of material is a polymer.

6. Said method of claim 4, wherein the first conductivity is associated with a first memory state of the bit of data and the second conductivity is associated with a second memory state of the bit of data.

7. A method to read a bit of data, comprising:

exposing a layer of material, having a first side and a second side, to an electron beam having a first energy level, the layer of material having a first conductor coupled with the first side and a second conductor coupled with the second side;

inducing a first current in the first conductor and a second current in the second conductor during said exposing; and

relating the first current and the second current to memory states of the bit of data.

8. Said apparatus of claim 7, wherein the layer of material has been modified before said exposing by an electron beam having a second energy level, the second energy level being larger than the first energy level.

9. Said method of claim 7, wherein said relating associates the first current in the first conductor with the memory states.

10. Said method of claim 7, wherein said relating associates the second current in the second conductor with the memory states.

11. Said method of claim 7, wherein the first conductor is part of a differentially conducting path.

12. Said method of claim 7, wherein the second conductor is part of a differentially conducting path.

13. Said method of claim 7, wherein the layer of material is a polymer.

14. An apparatus to store a bit of data, comprising:

a volume of material having a first side and a second side;

a first conductive material disposed on said first side; and

a second conductive material disposed on said second side, wherein an electron beam, irradiated on said volume of material, having damaged cross-links in said volume of material wherein a conductivity of said volume of material is changed thereby.

15. Said apparatus of claim 14, wherein said volume of material is a polymer.

16. An apparatus to store a bit of data, comprising:

a volume of material having a first side and a second side;

a first conductive material disposed on said first side; and

a second conductive material disposed on said second side, wherein an electron beam, irradiated on said volume of material, having formed cross-links in said volume of material wherein a conductivity of said volume of material is changed thereby.

17. Said apparatus of claim 16, wherein said volume of material is a polymer.

18. An apparatus to read a bit of data, comprising:

a volume of material having a first side and a second side;

a first conductive material disposed on said first side;

a second conductive material disposed on said second side;

a reference conductor; and

an electron beam source, to generate an electron beam incident upon said volume of material to create a first current to be measure between said first conductive material and said reference conductor and a second current to be measured between said second conductive material and said reference conductor.

19. Said apparatus of claim 18, further comprising an amplifier to amplify the first current.

20. Said apparatus of claim 18, further comprising an amplifier to amplify the second current.

21. Said apparatus of claim 18, wherein said volume of material is a polymer.

22. An apparatus to read a bit of data comprising:

a volume of material having a first side and a second side;

a first conductive material disposed on said first side;

a P-N junction disposed on said second side;

a reference conductor coupled with said P-N junction; and

an electron beam source, to generate an electron beam incident upon said volume of material to create a first current to be measure between said first conductive material and said reference conductor and a second current to be measured between said second conductive material and said reference conductor.

23. Said apparatus of claim 22, wherein said volume of material is a polymer.

24. Said apparatus of claim 22, wherein an N-type layer of said P-N junction is coupled with said volume of material.

25. Said apparatus of claim 22, wherein said P-N junction is a direct band semiconductor.

26. Said apparatus of claim 22, further comprising a thin conductive interlayer to backwards bias said P-N junction.

27. An apparatus to read a bit of data comprising:

a volume of material having a first side and a second side;

a first conductive material disposed on said first side;

a P-N junction disposed on said second side;

an electron beam source, to generate an electron beam incident upon said first side of said volume of material to cause an emission of photons from said P-N junction; and

a photo-detector responsive to the emission of photons, wherein an output of said photo-detector to be associated with the bit of data.

28. Said apparatus of claim 27, further comprising a substantially transparent layer coupled with said P-N junction, wherein the emission of photons to pass through said substantially transparent layer.

29. Said apparatus of claim 27, wherein said volume of material is a polymer.

30. Said apparatus of claim 27, wherein said P-N junction is a direct band semiconductor.

31. Said apparatus of claim 27, further comprising an enclosure to contain said electron beam source and said volume of material, in a vacuum, to create a data storage device.

32. Said apparatus of claim 31, further comprising:

a processor coupled with said data storage device;

a system bus coupled with said processor; and

a data storage device controller to control data transfer between said data storage device and said processor.

33. Said apparatus of claim 32, further comprising a display coupled with said system bus.

34. A method to store a bit of data, comprising:

exposing a volume of material, having a first electroluminescence intensity (EL), to an electron beam; and

changing the first EL intensity to a second EL intensity during said exposing, wherein the bit of data is stored.

35. Said method of claim 34, wherein the first EL intensity is associated with a first memory state of the bit of data and the second EL intensity is associated with a second memory state of the bit of data.

36. Said method of claim 34, wherein the volume of material is a polymer.

37. Said method of claim 36, wherein the polymer is selected from the group consisting of poly(phenylene vinylene), polythiophenes, polypyridines, poly(pyridyl vinylenes) and polyphenylenes.

38. Said method of claim 36, wherein the polymer is a copolymer of said polymer selected from the group consenting of poly(phenylene vinylene), polythiophenes, polypyridines, poly(pyridyl vinylenes) and polyphenylenes.

39. An apparatus to store a bit of data comprising:

a volume of material having a first side and a second side;

a first conductive material disposed on said first side; and

a second conductive material disposed on said second side, wherein an electron beam to be irradiated on said volume of material to change a first electroluminescence intensity (EL) of said volume of material to a second EL wherein the bit of data is stored.

40. Said apparatus of claim 39, wherein said volume of material is a polymer.

41. Said method of claim 40, wherein said polymer is selected from the group consisting of poly(phenylene vinylene), polythiophenes, polypyridines, poly(pyridyl vinylenes) and polyphenylenes.

42. Said method of claim 40, wherein said polymer is a copolymer of said polymer selected from the group consenting of poly(phenylene vinylene), polythiophenes, polypyridines, poly(pyridyl vinylenes) and polyphenylenes.

43. An apparatus to read a bit of data comprising:

a volume of material having a first side and a second side;

a first conductive material disposed on said first side;

a second conductive material disposed on said second side;

an electron beam source, to generate an electron beam having a first energy level, incident upon said first side of said volume of material to cause an emission of photons from said volume of material; and

a photo-detector responsive to the emission of photons, wherein an output of said photo-detector to be associated with the bit of data.

44. Said apparatus of claim 43, further comprising a substantially transparent layer coupled with said second conductive material, wherein the emission of photons to pass through said substantially transparent layer.

45. Said apparatus of claim 43, wherein said volume of material is a polymer.

46. Said apparatus of claim 43, further comprising an enclosure to contain said electron beam source and said volume of material, in a vacuum, to create a data storage device.

47. Said apparatus of claim 46, further comprising:

a processor coupled with said data storage device;

a system bus coupled with said processor; and

a data storage device controller to control data transfer between said data storage device and said processor.

48. Said apparatus of claim 47, further comprising a display coupled with said system bus.

49. A method to read a bit of data, comprising:

exposing a first layer of polymer, having a first side and a second side, to an electron beam having a first energy level, the first layer of polymer having a first conductor coupled with the first side and a second layer of polymer coupled with the second side and a second conductor coupled with the second layer of polymer;

inducing a first current in the first conductor and a second current in the second conductor during said exposing; and

relating the first current and the second current to memory states of the bit of data.

50. Said apparatus of claim 49, wherein a conductivity of the first layer of polymer has been modified before said exposing by an electron beam having a

second energy level, the second energy level being larger than the first energy level.

51. Said method of claim 49, wherein said relating associates the first current in the first conductor with the memory states.

52. Said method of claim 49, wherein said relating associates the second current in the second conductor with the memory states.

53. Said method of claim 49, wherein the first conductor is part of a differentially conducting path.

54. Said method of claim 49, wherein the second conductor is part of a differentially conducting path.

55. An apparatus to read a bit of data, comprising:

a first volume of polymer having a first side and a second side;

a first conductive material disposed on said first side;

a second volume of polymer disposed on said second side, wherein a conductivity of said second volume of polymer remaining substantially constant;

a second conductive material disposed on said second volume of polymer; and

an electron beam source, to cause an electron beam incident on said first volume of polymer, wherein an electron beam current distribution to be measured differentially between said first conductor and said second conductor reads the bit of data.

56. Said apparatus of claim 55, wherein an impedance of said second polymer layer is greater than an impedance of said first polymer layer.

57. Said apparatus of claim 55, further comprising an amplifier to amplify a current of the electron beam current distribution.